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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/625,174	07/22/2003	Hyun-Jin Chung	51876P351	8246
8791	7590	05/21/2004	EXAMINER	
BLAKELY SOKOLOFF TAYLOR & ZAFMAN 12400 WILSHIRE BOULEVARD, SEVENTH FLOOR LOS ANGELES, CA 90025			THOMAS, ERIC W	
			ART UNIT	PAPER NUMBER
			2831	

DATE MAILED: 05/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/625,174

Applicant(s)

CHUNG, HYUN-JIN

Examiner

Eric W Thomas

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 4/03.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claims 2, 5 are objected to because of the following informalities:

Claim 2, line 3, change "the bottom electrode" to --the [bottom] electrode--.

Appropriate correction is required.

Claim 5, line 1, insert --for-- after "method".

Claim 5, line 3, change "an" to --a--.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 4-5, 8 are rejected under 35 U.S.C. 102(b) as being anticipated by Ahn et al. (KR 2001-63468).

Ahn et al. disclose in fig.1c, a capacitor comprising: an electrode (12); an oxygen diffusion layer (13) containing aluminum (abstract) on the bottom electrode; a dielectric layer (14) on the oxygen diffusion barrier layer; and a top electrode (16) on the dielectric layer.

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Regarding claim 4, Ahn et al. disclose the oxygen diffusion barrier layer is an alumina layer (abstract).

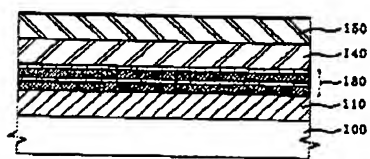
Regarding claim 5, Ahn et al. disclose a method for fabricating a capacitor, comprising the steps of:

- a) forming a bottom electrode (12);
- b) forming an oxygen diffusion barrier layer (13) containing aluminum on the bottom electrode;
- c) forming a dielectric layer (14) on the oxygen diffusion barrier layer; and
- d) forming a top electrode (16).

Regarding claim 8, Ahn et al. disclose the oxygen diffusion barrier is an alumina layer (see abstract).

Claims 1, 4-5, 8-10 are rejected under 35 U.S.C. 102(b) as being anticipated by Ahn et al. (US 2002/0094624 A1).

FIG. 1d



Ahn et al. disclose in fig.1d, a capacitor comprising: an electrode (100 – electrode formed with substrate – cell capacitor); an oxygen diffusion layer (110) containing aluminum (paragraph 17) on the bottom electrode; a dielectric layer (130) on the oxygen diffusion barrier layer; and a top electrode (140) on the dielectric layer.

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Regarding claim 4, Ahn et al. disclose the oxygen diffusion barrier layer is an alumina layer (paragraph 17).

Regarding claim 5, Ahn et al. disclose a method for fabricating a capacitor, comprising the steps of:

a) forming a bottom electrode (100 – electrode formed with substrate – cell capacitor);

b) forming an oxygen diffusion barrier layer (110) containing aluminum on the bottom electrode;

c) forming a dielectric layer (130) on the oxygen diffusion barrier layer; and

d) forming a top electrode (140).

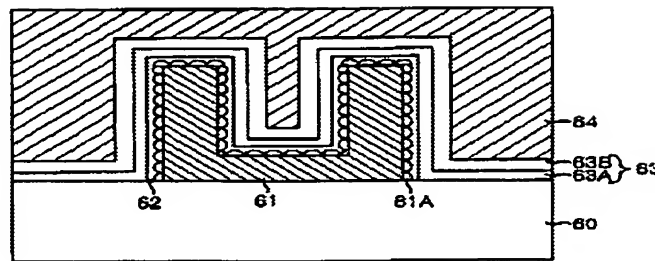
Regarding claim 8, Ahn et al. disclose the oxygen diffusion barrier is an alumina layer (see paragraph 17).

Regarding claim 9, Ahn et al. disclose the alumina is formed by using an atomic layer deposition technique (see paragraph 17).

Regarding claim 10, Ahn et al. disclose the alumina is formed at a temperature of about 200 – 450 degrees C).

4. Claims 1-8 are rejected under 35 U.S.C. 102(e) as being anticipated by Lee et al. (US 2003/0052374 A1).

FIG. 8



Lee et al. disclose in fig. 8, a capacitor comprising: an electrode (61); an oxygen diffusion layer (63A) containing aluminum (paragraph 86) on the bottom electrode; a dielectric layer (63B) on the oxygen diffusion barrier layer; and a top electrode (64) on the dielectric layer.

Regarding claim 2, Lee et al. disclose the capacitor further comprises an oxygen diffusion layer (62) containing nitrogen (paragraph 80) between the electrode and the oxygen diffusion layer containing aluminum.

Regarding claim 3, Lee et al. disclose the bottom electrode includes hemispherical grains in a surface thereof.

Regarding claim 4, Lee et al. disclose the oxygen diffusion barrier layer is an alumina layer (paragraph 81).

Regarding claim 5, Lee et al. disclose a method for fabricating a capacitor, comprising the steps of:

- a) forming a bottom electrode (61);
- b) forming an oxygen diffusion barrier layer (63A) containing aluminum on the bottom electrode;

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- c) forming a dielectric layer (63B) on the oxygen diffusion barrier layer; and
- d) forming a top electrode (64).

Regarding claim 6, Lee et al. disclose step (a) includes the steps of:

A1) forming a hemi-spherical grains (61A) on a surface of the bottom electrode;
and

A2) forming an oxygen diffusion layer (62) containing nitrogen (paragraph 80) on the bottom electrode.

Regarding claim 7, Lee et al. disclose the oxygen diffusion barrier layer containing nitrogen is formed by using a rapid thermal process (paragraph 95).

Regarding claim 8, Lee et al. disclose the oxygen diffusion barrier is an alumina layer (see paragraph 86).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ahn et al. (KR 2001-63468) in view of Lee (US 6,355,519).

Regarding claim 2, Ahn et al. disclose the claim invention except for an oxygen diffusing layer containing nitrogen between the bottom electrode and the oxygen diffusion layer containing aluminum.

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Lee teaches the use of an oxygen diffusing layer containing nitrogen between an alumina layer and an electrode.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the capacitor of Ahn et al. using an oxygen diffusion layer containing nitrogen between the alumina layer and the electrode as taught by Lee, since such a modification would prevent the formation of a native oxide layer on a surface of the first electrode.

7. Claim ³~~4~~ is rejected under 35 U.S.C. 103(a) as being unpatentable over Ahn et al. (KR 2001-63468) in view of applicant's admitted prior art (AAPA). 25/11/07

Ahn et al. disclose the claimed invention except for the bottom electrodes includes hemi-spherical grains on a surface thereof.

AAPA teaches that it is known to form hemi-spherical grains on the surface of an electrode.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the capacitor of Ahn et al. by forming hemi-spherical on the electrode; since such a modification would improve the surface area of the capacitor.

8. Claims 6-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ahn et al. (KR 2001-63468) in view of Lee (US 6,355,519) and applicant's admitted prior art (AAPA)

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Ahn et al. disclose the claimed invention except for forming hemi-spherical grains on a surface of the bottom electrodes and forming an oxygen diffusion layer containing nitrogen on the bottom electrode.

AAPA teaches that it is known to form hemi-spherical grains on the surface of an electrode.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the capacitor of Ahn et al. by forming hemi-spherical on the electrode; since such a modification would improve the surface area of the capacitor.

Lee teaches the use of an oxygen diffusing layer containing nitrogen between an alumina layer and an electrode.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the capacitor of Ahn et al. using an oxygen diffusion layer containing nitrogen between the alumina layer and the electrode as taught by Lee, since such a modification would prevent the formation of a native oxide layer on a surface of the first electrode.

Regarding claim 7, Lee teaches that the oxygen diffusion barrier layer containing nitrogen is formed by using a rapid thermal process (see col. 4 lines 20-35).

Conclusion

In order to ensure full consideration of any amendments, affidavits, or declaration, or other documents as evidence of patentability, such documents must be submitted in response to this Office action. Submissions after the next Office action,

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which is intended to be a final action, will be governed by the requirements of 37 CFR 1.116 which will be strictly enforced.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric W Thomas whose telephone number is (571) 272-1985. The examiner can normally be reached on M, T, Sa 9:00AM - 9:30PM; W, Th, F 5:30PM-10:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dean Reichard can be reached on (571) 272-1984. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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